Dell Storage MD1280
Service Guide

Regulatory Model: SP-2584, E11J

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your computer.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

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1

About the Dell Storage MD1280 Service Guide

The Dell Storage MD1280 Service Guide provides information about enclosure service and maintenance.

Dell Storage MD1280 overview

A Dell Storage MD1280 enclosure holds the physical disk drive storage. The interface between the controller I/O cards and the enclosure is referred to as back-end connectivity.

Dell Storage MD1280 hardware

The Dell Storage MD1280 is a 5U SAS enclosure and supports up to 84 hard drives in 3.5-inch carriers, installed in a two-drawer, three-row, and 14-column configuration. The Dell Storage MD1280 enclosure ships with two redundant power supply units (PSUs), five redundant cooling fan modules, and two redundant 6 Gbps SAS I/O modules.

Dell Storage MD1280 monitoring

The Storage Enclosure Management software enables you to manage, update, and monitor MD1280. For more information, see *Dell Storage MD1280 Administrator's Guide* available at **www.dell.com/support**.

The Dell Storage MD1280 enclosure uses LED indicators to indicate an issue with the enclosure.

NOTE: Dell OpenManage Server Administrator is not available for the Dell Storage MD1280 enclosure.

Front-panel features and indicators

The front panel displays the enclosure and power status.

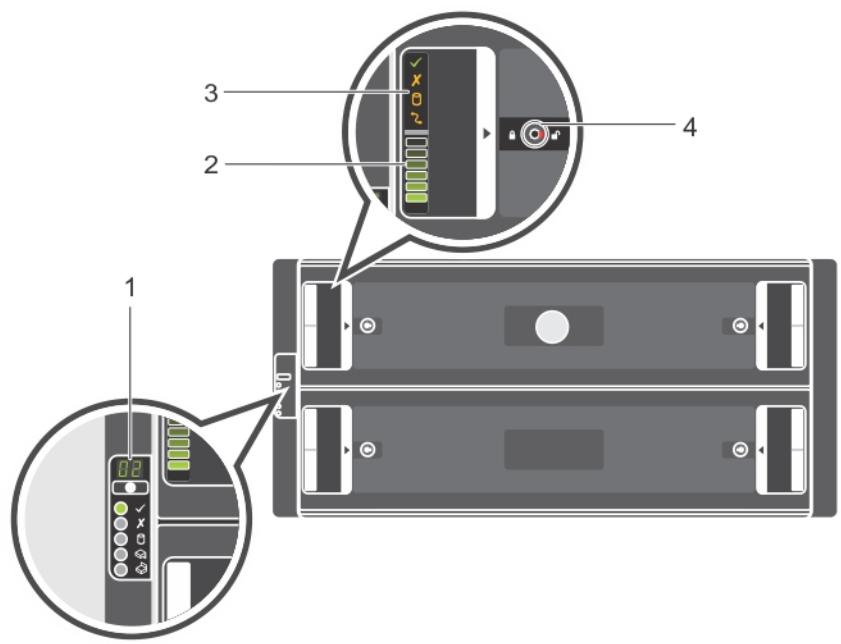

Figure 1. Front-panel features and indicators

Table 1. Front-panel features and indicators

Item	Name	Panel	Description
1	Enclosure status indicator		• **Unit ID Display**: Displays the enclosure unit identification number. The unit identification number is helpful when setting up and maintaining a multiple-enclosure configuration. • **Input Switch**: Not used. • **Power On/Standby**: – Off — The enclosure power is turned off – Green — The enclosure is 'On' (operational) – Amber — The enclosure is in standby (not operational) mode. • **Module Fault**: Amber when there is a hardware fault. Also, an LED may glow on a PSU, hard drive, DDIC, fan module, or EMM indicating a faulty device. • **Logical Status**: Amber when there is a change of status or when devices other than the enclosure fails. • **Drive drawer 1 Fault**: Amber when a hard drive, cable, or sideplane fails in drive drawer 1.

Item	Name	Panel	Description
			• **Drive drawer 2 Fault**: Amber when a hard drive, cable, or sideplane fails in drive drawer 2.
2	Drive drawer-specific left and right side enclosure activity indicators		**Activity Bar Graph**: Six variable-intensity LEDs glow dynamically displaying access of the hard drives in that specific enclosure drive drawer.
3	Drive drawer-specific left and right side status indicators		• **Sideplane OK** or **Power Good**: – Off — Sideplane card or cable fault – Green — Sideplane card and cable are functional (though a fault may be indicated by one or more of the following LEDs). * **Drive drawer Fault**: Amber — Sideplane card fault or hard drive failure causing loss of availability or redundancy. * **Logical Fault:** • Amber (steady) — Host indicated hard drive fault • Amber (blinking) — Arrays in impacted state * **Cable Fault**: Amber — Cable fault
4	Drive drawer-specific anti-tamper locks		Locks the drive drawer by using a Torx T20 screwdriver until the red arrows point to the locked icon (away from the center of the enclosure).

Back-panel features and indicators

The back panel displays PSU, connectivity, and fault indicators.

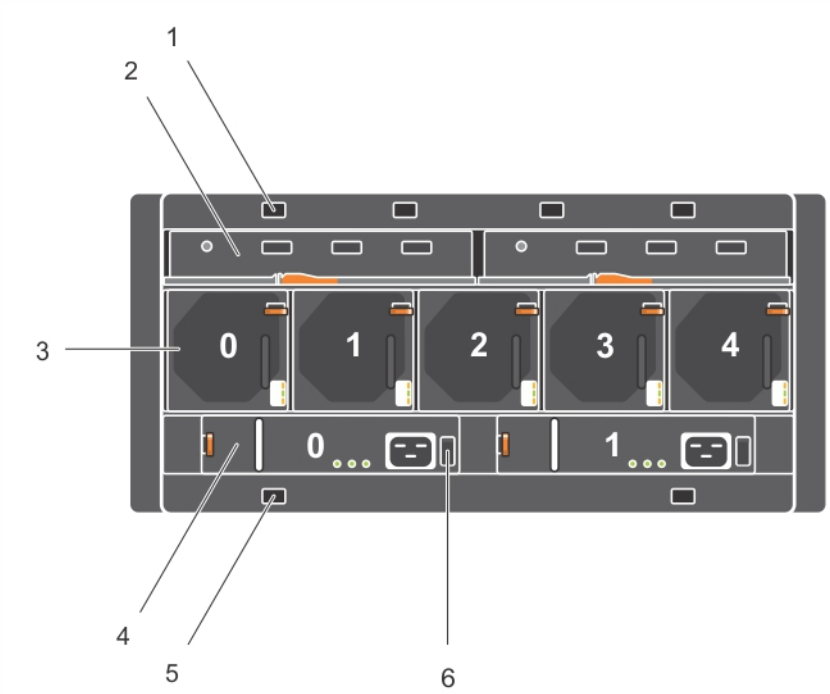

Figure 2. Back-panel features and indicators

Table 2. Back-panel features and indicators

Item	Control/Feature
1	Optional cable retention positions (4)
2	I/O enclosure management modules (2)
3	Fan modules (5) **NOTE:** Each fan module includes two fans. The Storage Enclosure Management Software lists 10 fans 0–9. The physical enclosure enumerates the enclosures 1–5. Therefore, in the Storage Enclosure Management Software, fans 0–1 are related to fan module 0, fans 2–3 are related to fan module 1, fans 4–5 related to fan module 4, fans 6–7 are related to fan module 5, and fans 8–9 are related to fan module 5.
4	PSUs (2)
5	Optional cable retention positions (2)
6	Power switches (2)

I/O EMM features and indicators

Dell Storage MD1280 enclosure includes two I/O Enclosure Management Modules (EMMs).

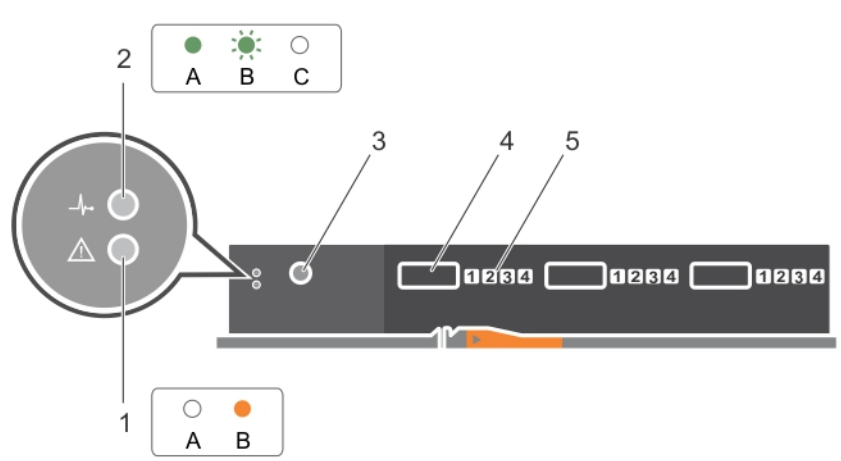

Figure 3. I/O EMM features and indicators

Table 3. I/O EMM features and indicators

Item	Control/Feature	Icon	Description
1	Fault LED		• **Off** — Module OK • **Amber** — Module fault
2	Power LED		• **Green** (steady) — Module OK • **Green** (blinking) — Vital product data (VPD) fault • **Off** — Module fault
3	Console port		Factory use only
4	SAS ports		Connect to an HBA or to another enclosure
5	SAS port link status indicator LEDs		• **Green** (steady) — Connected, but not active • **Green** (blinking) — Connected and active • **Off** — Not connected

Fan module features and indicators

Dell Storage MD1280 enclosure includes five fan modules in five interface slots.

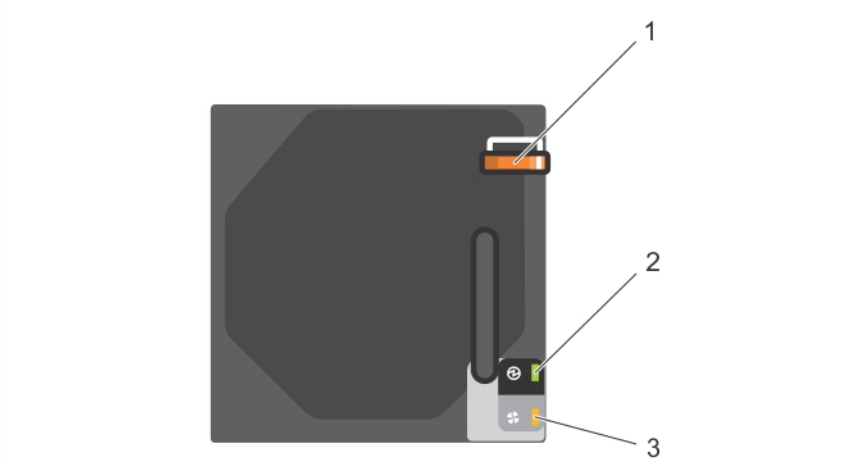

Figure 4. Fan module features and indicators

Table 4. Fan module features and indicators

Item	Control/Feature	Icon	Description
1	Release latch		Releases fan from enclosure
2	Module OK		**Green** — Module OK
3	Fan fault		**Amber** — Loss of communication with the fan module, or reported fan speed is out of specification.

PSU features and indicators

Dell Storage MD1280 enclosure includes two PSUs in two interface slots.

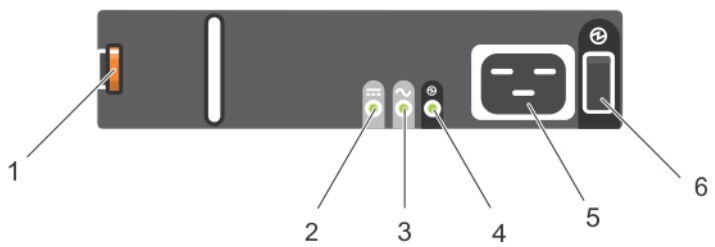

Figure 5. PSU features and indicators

Table 5. PSU features and indicators

Item	Control/Feature	Icon	Description
1	Release latch		Releases PSU from enclosure
2	PSU fault		• **Amber** (steady) — PSU fault or PSU not working • **Amber** (blinking) — PSU firmware is downloading
3	AC fault		• **Amber** (steady) — AC power is not detected • **Amber** (blinking) — PSU firmware is downloading
4	Power OK		• **Green** (steady) — PSU is working • **Green** (blinking) — AC power is present, but the PSU is in standby mode (the other PSU is working)
5	Power Connector		Connect the external power supply source to this connector.
6	Power switch		The power switch controls the PSU output to the system.

If all three LEDs are off then there is no AC power supplied to either PSU.

DDIC indicator

The Disk Drive In Carrier (DDIC) includes one status indicator.

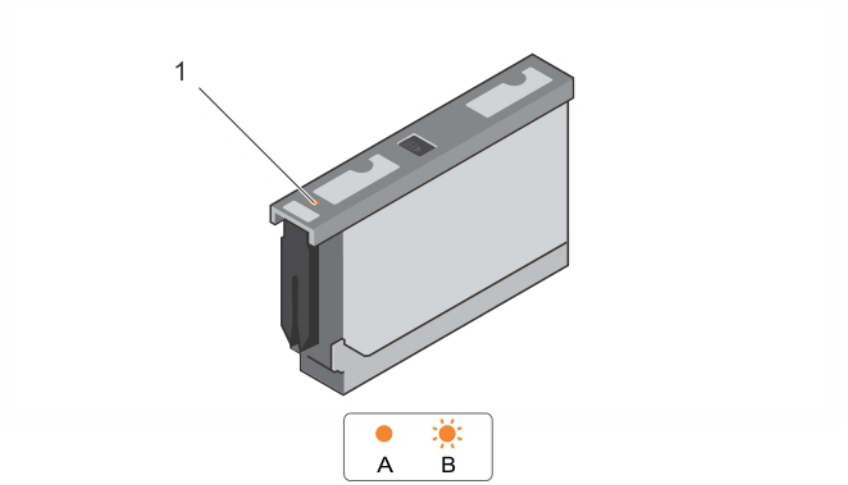

Figure 6. DDIC indicator

Table 6. DDIC indicator

Item	Feature	Icon	Indicator Code
1	DDIC fault indicator		• **Amber** — Hard drive fault • **Amber** (blinking) — When a hard drive or enclosure fails, or a command is run to blink the drive or the enclosure, the associated LED blinks every second. When a hard drive fails, the fault LED of the hard drive drawer that contains the hard drive blinks. However, when an enclosure fails, the fault LEDs of all hard drives and both drive drawers blinks.

2

Replacing Dell Storage MD1280 components

This section describes the tasks to replace field replaceable units (FRUs) inside the Dell Storage MD1280 enclosure. Here, it is assumed that the user has already received the appropriate replacement device and is ready to install the device in the enclosure.

Safety precautions

To avoid injury and damage to the enclosure, always follow these safety precautions.

WARNING: See the safety and regulatory information that shipped with your system. Warranty information may be included within this document or as a separate document.

Electrical safety precautions

To avoid injury and damage to the enclosure, always follow electrical safety precautions.

WARNING: Disconnect power from the enclosure when removing or installing components that are not hot-swappable. When disconnecting power, first turn off the EMMs and enclosure. Remove the power cords from all the PSUs in the enclosure.

- Know the locations of the following in your system environment: power switch of the equipment, emergency power button, switch to turn off power, and electrical outlet of the system.
- Do not work alone when working with high-voltage components.
- Do not use mats designed to decrease electrostatic discharge as protection from electrical shock. Instead, use rubber mats that are designed as electrical insulators.
- The PSU cord must include a grounding prong and must be plugged into a grounded electrical outlet.

General safety precautions

To avoid injury and damage to an enclosure, always follow general safety precautions.

WARNING: Do not lift the enclosure without any assistance. If installed above the lower 20U of a rack, a customer-provided mechanical lift must be used to avoid injury.

- Keep the area clean and free of clutter around the chassis.
- While working on the enclosure, do not wear loose clothing, such as neckties and unbuttoned shirt sleeves, which can come into contact with electrical circuits or be pulled into a cooling fan.
- Remove any jewelry or metal objects from your body because they are excellent electricity conductors that can create short circuits and harm you if they come into contact with printed circuit boards (PCBs) or areas where power is available.

CAUTION: If the enclosure system operates for too long (depending on altitude) with drive drawers open, the enclosure can overheat, causing power failure and data loss. Such use may invalidate the warranty.

Electrostatic discharge precautions

To avoid injury and damage to the enclosure, always follow electrostatic discharge (ESD) precautions.

ESD is generated by two objects with different electrical charges coming into contact with each other. The resulting electrical discharge can damage electronic components and PCBs.

- Dell recommends to always use an antistatic mat and antistatic wrist or ankle strap while working on components in the interior of an enclosure.
- Observe all conventional ESD precautions when handling plug-in modules and components.
- Avoid contact with backplane components and module connectors.
- When you are not using the components and PCBs, keep them in their antistatic bags.

Pre-replacement tasks

If the FRU is not hot-swappable, the EMMs and enclosure must be turned off.

Turning off the EMMs and enclosure

About this task
To turn off the EMMs and enclosure, complete the following tasks:

Steps

1. Before turning off the EMMs and enclosure, identify the failed devices.
2. Stop I/O to the storage enclosure.
3. Turn off the EMMs and PSUs in the enclosure using the power switches located on the corresponding devices.
4. Disconnect power from the enclosure by removing the power cords from all the PSUs in the enclosure.

Replacing PSUs

The Dell Storage MD1280 enclosure supports two 2.8kW AC hot-swappable PSUs. If one PSU stops functioning, the second PSU continues to supply power to the enclosure.

Identifying the failed PSU

To identify a non-functioning PSU, use the secli component of the Storage Enclosure Management Software or visually verify which PSU is not functioning. For more information on using the secli to identify failed devices, see the *Dell Storage MD1280 Administrator's Guide*.

Replacing a PSU

About this task
To replace failed PSUs, complete the following tasks:

Steps

1. Turn off the PSU switch.
2. Remove the power cord from the securing clip and then remove the power cord from the PSU.
3. Push the red release tab to right and hold it, and then slide the PSU out of the chassis by using the PSU handle.

CAUTION: The PSUs are heavy. To avoid injury, use both hands while removing the module.

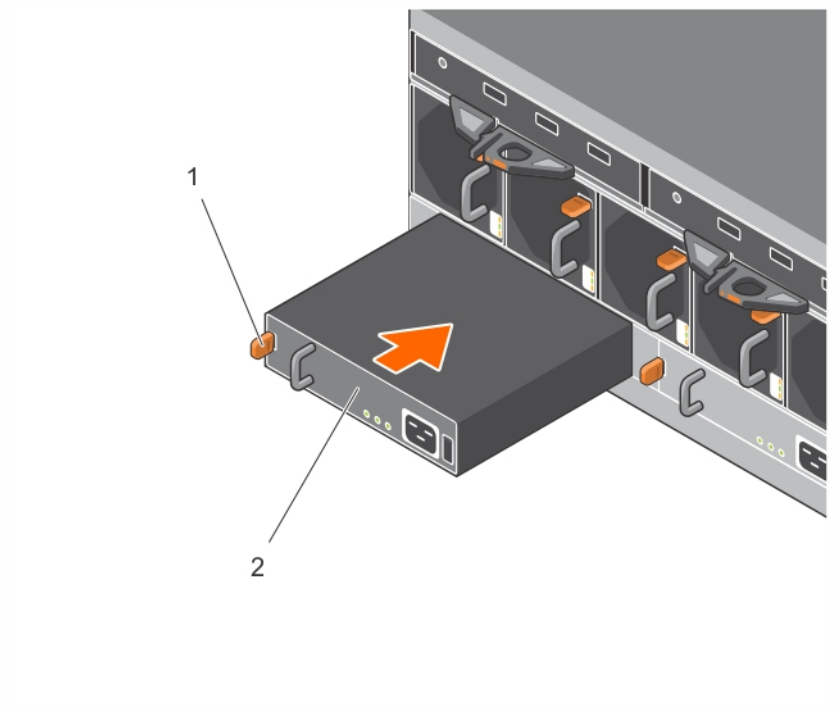

Figure 7. Removing a PSU

1. Release tab
2. PSU

4. Slide the replacement PSU module into the chassis until it is fully seated and the release tab clicks into place.
5. Connect the power cord to the PSU and ensure that the power cord is inserted into a power outlet.
6. Secure the power cord by using the clip.

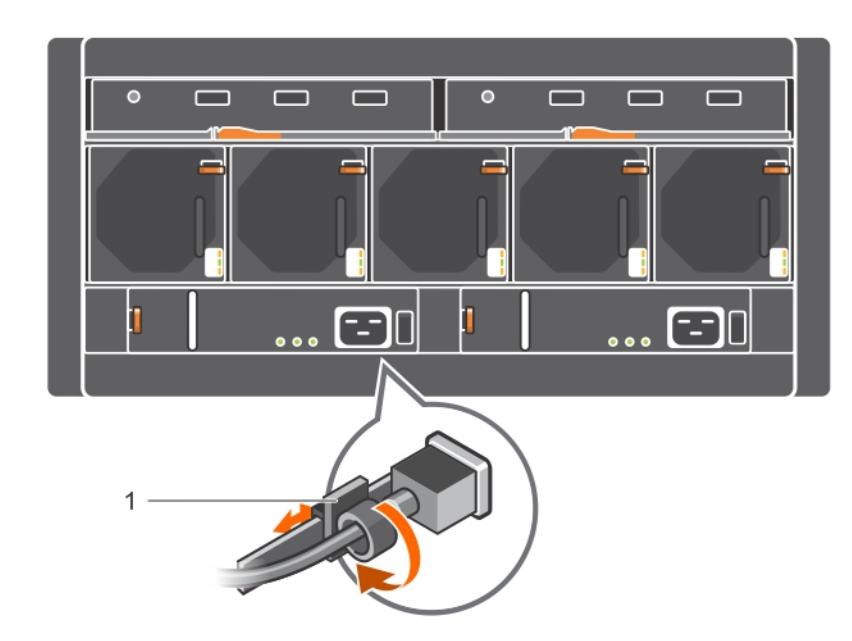

Figure 8. Securing the power cord

1. Power cable securing clip

7. Turn on the PSU switch.

NOTE: Allow the enclosure to identify the PSU and determine its status. If the PSU is functioning properly, the PSU's Power OK LED glows green and the PSU fault LED and AC fault LED are off.

Replacing fan modules

The Dell Storage MD1280 enclosure supports five fan modules. If one fan module fails, the remaining modules continue to cool the enclosure.

NOTE: When a fan module fails, the fan speed in the remaining modules increases significantly to provide adequate cooling. The fan speed decreases gradually when a new fan module is installed.

Identifying the failed fan module

To identify the failed fan module, use the secli component of the Storage Enclosure Management Software or visually verify which fan module is not functioning properly. For more information on using the secli to identify failed devices, see the *Dell Storage MD1280 Administrator's Guide*.

Replacing a fan module

About this task

To replace a failed fan module, complete the following tasks:

Steps

1. Press the red release tab and pull the fan module out of the chassis by using the handle.

CAUTION: The fan modules are heavy. To avoid injury, use both hands while removing the module.

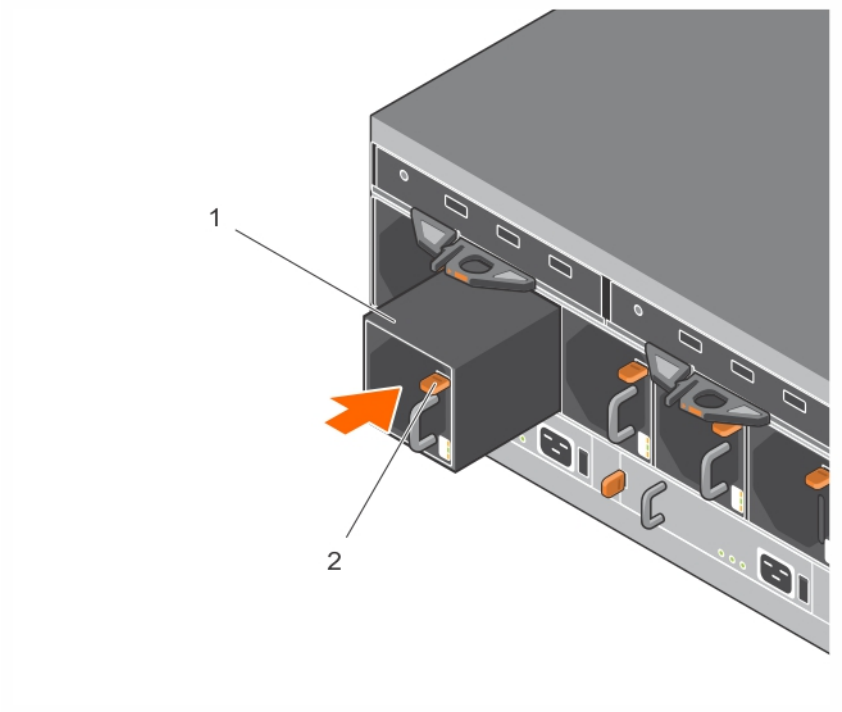

Figure 9. Removing a fan module

1. Fan module
2. Release tab

2. Rotate the replacement fan module so that the release tab and handle are on the right side.
3. Slide the replacement fan module into the chassis until it is fully seated and the release tab clicks into place.

NOTE: Allow the enclosure to identify the fan module and determine its status. If the fan module is functioning properly, fan module's Module OK LED glows green and the battery fault LED and fan fault LED are off.

Replacing hard drives

The Dell Storage MD1280 enclosure supports hot-swappable hard drives and supports up to 84 hard drives in 3.5-inch carriers, installed in a two-drawer, three-row, 14-column configuration. Hard drives are connected to a backplane by using Disk Drive in Carrier (DDIC) hard drive carriers.

Numbering the hard drive

Hard drives are numbered in the secli, starting with 0. Dell Storage MD1280 DDIC slots are numbered 1–42 in drive drawer 0, from front to back and left to right, and 43–84 in drive drawer 1.

NOTE: The enumeration of hard drives in the secli software is zero-based. The physical enclosure enumerates hard drives starting from 1.

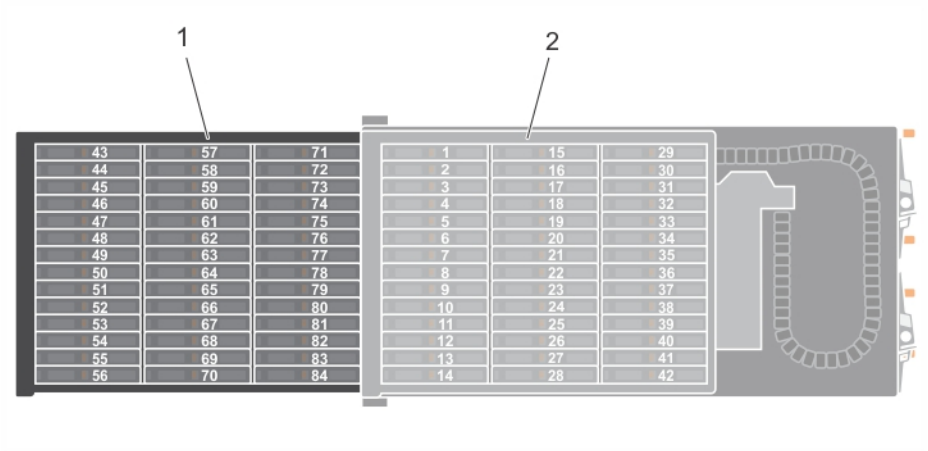

Figure 10. Numbering the hard drive

1. Drive drawer 1
2. Drive drawer 0

Identifying the failed hard drive

To identify the failed hard drive, use the secli component of the Storage Enclosure Management Software or visually verify the failed hard drive. For more information on using the secli to identify failed devices, see the *Dell Storage MD1280 Administrator's Guide*.

Replacing hard drives

About this task

Hard drives can be replaced one at a time without turning off the enclosure. To replace failed hard drives, complete the following tasks:

Steps

1. Find the Dell Storage MD1280 enclosure and the drive drawer containing the failed hard drive. The fault drive drawer LED glows.

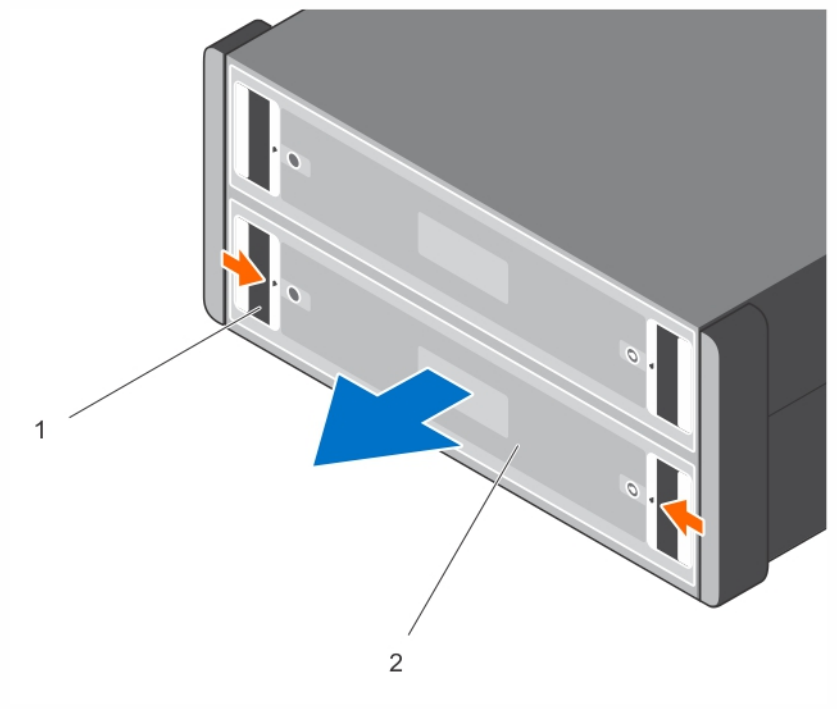

Figure 11. Opening a DDIC

1. Drive drawer latches (2 per drawer)
2. Drive drawer

CAUTION: Before opening a drive drawer, ensure that the system is not indicating a temperature warning. This issue must be rectified first to avoid potential hard drive failure and data loss.

2. Push and hold both red drive drawer latches toward the center of the drive drawer and pull the drive drawer out.

CAUTION: If the Dell Storage MD1280 enclosure operates for too long (depending on altitude) with drive drawers open, the enclosure can overheat, causing potential hard drive failure and data loss. Such use may invalidate the warranty.

3. Find the failed DDIC by the glowing LED.
4. Press the release button to unlatch the DDIC.
5. Wait for 10 seconds for the hard drive to spin down.
6. Slide the DDIC up and out until it is free of the DDIC slot.

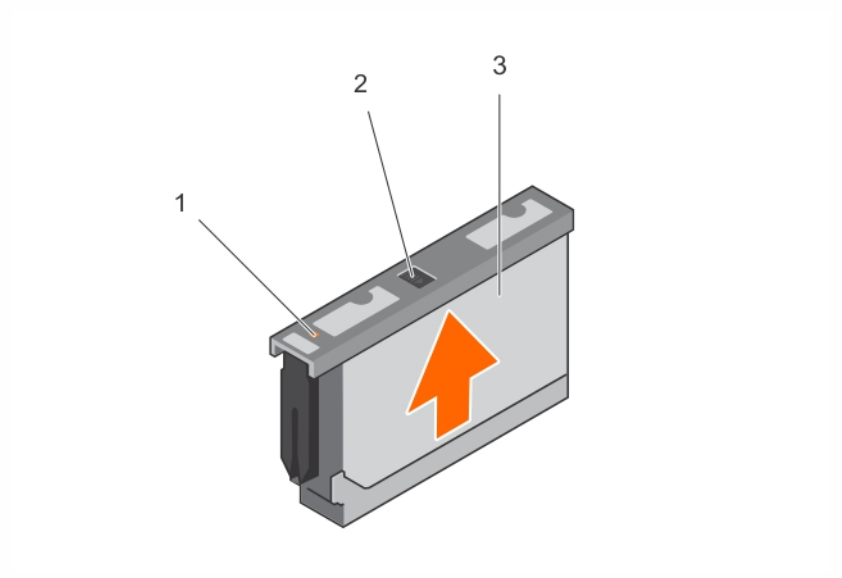

Figure 12. Removing a DDIC

1. Hard drive fault LED
2. Release button
3. DDIC

NOTE: Leave the hard drive in the carrier. The replacement hard drive will be in the carrier and attempting to remove the carrier can cause the carrier to break.

7. Slide the replacement DDIC into the slot, push and hold the DDIC down while sliding it toward the back of the enclosure until the DDIC latches to the backplane.

CAUTION: If the DDIC fails to latch, do not use it and request a replacement. If a faulty DDIC unlatches within a closed drive drawer then you will not be able to open the drive drawer.

CAUTION: To maintain proper airflow, the drive drawers must be populated with hard drives in whole rows at a time (there are three rows of 14 hard drives per drawer). The minimum number of hard drives in an enclosure is 14 (one full, front row in the top drive drawer), the number of populated rows between drive drawers must not differ by more than one. The rows should be populated from the front to the rear of the enclosure.

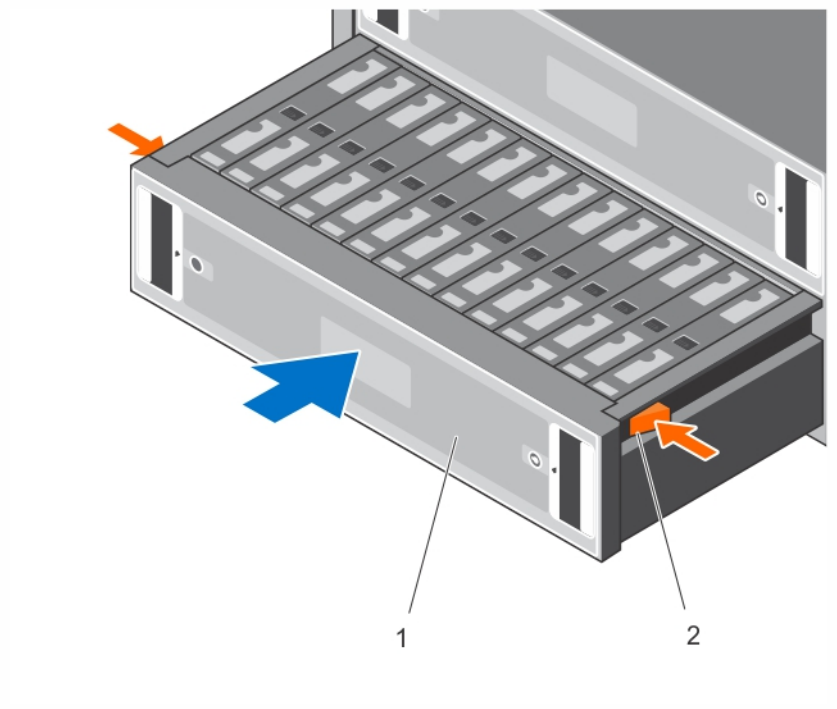

Figure 13. Closing a drive drawer

1. Drive drawer
2. Open-drawer lock

8. Close the drive drawer.
   a. Pull and hold both drive drawer releases and push the drive drawer inside slightly.
   b. Release and push the drive drawer until it clicks into a place.

   WARNING: After releasing the open-drawer locks, move hands away from the slides to avoid injury while pushing the drive drawer inside.

   NOTE: Allow the enclosure to identify the hard drive and determine its status. If the hard drive is functioning properly, DDIC LED is off.

Replacing I/O EMM modules

The Dell Storage MD1280 enclosure supports redundant hot-swappable I/O Enclosure Management Modules (EMMs).

EMMs provide the following data path and enclosure management functions for the enclosure:

- Monitoring and controlling enclosure environment elements such as temperature, fan, PSUs, and enclosure LEDs
- Controlling access to hard drives
- Communicating enclosure attributes and states to the host

Identifying the failed EMM

To identify the failed EMM, use the secli component of the Storage Enclosure Management Software or visually verify the EMM that is not functioning. For more information on using the secli to identify failed devices, see the *Dell Storage MD1280 Administrator's Guide*.

Replacing an EMM

About this task

EMMs can be replaced one at a time without turning off the enclosure. To replace failed EMMs, complete the following tasks:

Steps

1. Remove all cables from the EMM. Ensure all the cables are labeled.
2. Push the release tab to right and pull the release lever away from the chassis.
3. Grasp the release lever and pull the EMM away from the chassis.

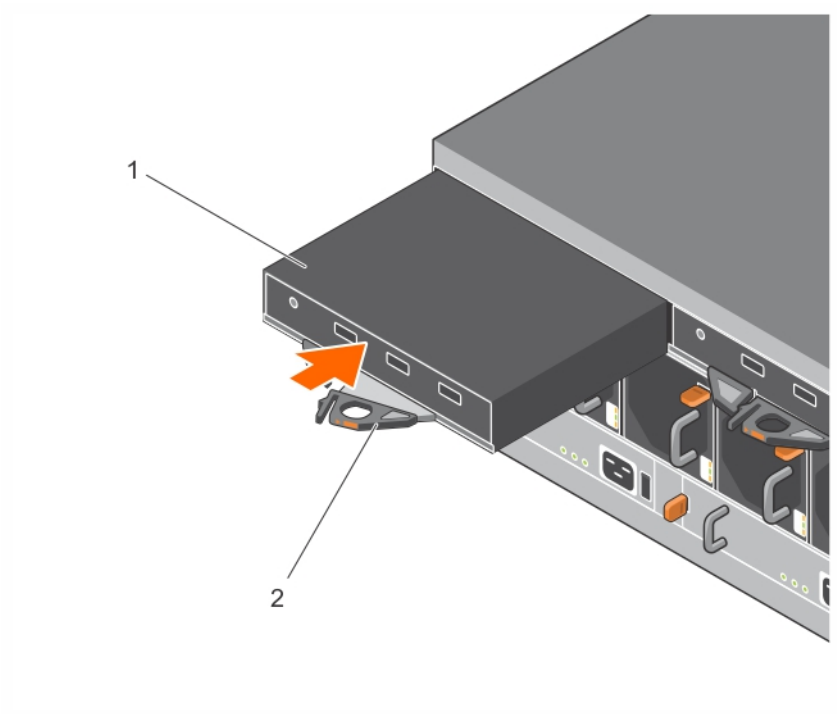

Figure 14. Replacing an EMM

1. EMM
2. EMM release lever

4. Insert the replacement EMM into the bay until it is fully seated.
5. Push the release lever toward the chassis until it clicks into place.
6. Connect all the cables to the EMM.

Replacing chassis

Replacing the chassis is required when non-FRU devices must be replaced. Replacing a chassis requires a scheduled maintenance window when the system is unavailable. The replacement chassis comes without any FRUs, and therefore all cards and DDICs must be transferred to the new chassis.

About this task

To replace a chassis, complete the following tasks:

Steps

1. Remove the Hold Down Brackets (HDBs).
   a. Remove the fixing screws from the rear of the enclosure.
   b. Remove the HDBs from the rear of the rack.
2. Remove all DDICs from the enclosure and place on a static free mat or bench. Note the slot position of each DDIC as you remove it, the DDICs must be reinstalled in the same slot position as in the original chassis.
3. Remove the enclosure from the rack rails.

   WARNING: Do not attempt to lift the enclosure without any assistance. If installed above the lower 20U of a rack, a customer-provided mechanical lift must be used to avoid injury.
4. Install the replacement chassis in the rack.
5. Install the HDBs.
6. Move all the back-panel parts (EMMs, fans, and PSUs) from the original chassis to the racked replacement.
7. Move the front panel bezel from drive drawer 0 from the original chassis onto the racked replacement.
8. Install the DDICs into the replacement.
9. Turn on the enclosure as described in the Post-replacement tasks section in this document.
10. An update to the electronically stored product ID and Service Tag must be applied. Contact your service provider.
11. Swap the bezel on drive drawer 0 of the failed chassis with the bezel on drive drawer 0 of the new chassis before loading back into the rack.
12. Service Tag is not included in the replacement chassis. Remove the Service Tag label from the old chassis and adhere it to the replacement chassis. Alternatively, mark the replacement chassis with the Service Tag information or print a new tag.

Replacing rack rails

Rack rails are used to install the Dell Storage MD1280 enclosure into a rack.

About this task

To replace rack rails, complete the following tasks:

NOTE: This procedure contains high-level tasks. For more information about the instructions, see the *Rack Installation Instructions* document available at **www.dell.com/support**.

Steps

1. Turn off the EMMs and enclosure as described in the Pre-replacement tasks section in this document.
2. Remove the HDBs.
   a. Remove the fixing screws from the rear of the enclosure.

b. Remove the HDBs from the rear of the rack.

3. Remove the enclosure from the rack rails.

   WARNING: Do not attempt to lift the enclosure without any assistance. If installed above the lower 20U of a rack, a customer-provided mechanical lift must be used to avoid injury.

4. Remove the rack rails from the rack.
5. Install the replacement rack rails in the rack.
6. Install the enclosure in the rack rails.
7. Install the HDBs.
8. Turn on the EMMs and enclosure as described in the Post-replacement tasks section in this document.

Post-replacement tasks

After replacing an FRU in Dell Storage MD1280, turn on the EMMs and enclosure, if they were turned off.

Turning on the EMMs and enclosure

About this task

If the servers and enclosure are turned off, turn on the servers by doing the following:

Steps

1. Insert the power cords.
2. Press the power button on the enclosures to turn on the power.

   NOTE: Always turn on the enclosures before turning on the host.

3. Ensure that the host is turned on.
4. Use the secli component of the Storage Enclosure Management Software to verify the replacement device is up and running. For more information on using the secli to identify failed devices, see the *Dell Storage MD1280 Administrator's Guide*
5. Install all available firmware update by using secli. For more information on using the secli to update firmware, see the *Dell Storage MD1280 Administrator's Guide*.

3

Troubleshooting Dell Storage MD1280 components

This section contains basic troubleshooting tasks for components inside the Dell Storage MD1280 enclosure.

Troubleshooting fan modules

About this task
To troubleshoot fan modules, complete the following tasks:

Steps

1. Determine the status of the fan module LEDs.
   If the fan fault LED glows, it implies that the fan module has failed.
2. Reseat the fan module by removing and reinstalling it.

   NOTE: Allow the enclosure to identify the fan module and determine fan's status.

Troubleshooting PSUs

About this task
To troubleshoot PSUs, complete the following tasks:

Steps

1. Determine the status of the PSU LEDs.
   a. If the PSU fault LED glows, it implies that the PSU has failed.
   b. If the Power OK LED is not glowing, check the power cord and power source into which the PSU is inserted:
      1. Connect another device to the power source and check whether the device works.
      2. Insert power cord to a different power source.
      3. Replace the power cord.
   c. If the AC fault LED glows, this PSU is not supplying power, though the other PSU may still be supplying the power.
2. Reseat the PSU by removing and reinstalling it.

   NOTE: Allow the enclosure to identify the PSU and determine PSU's status.

Troubleshooting DDICs

About this task
To troubleshoot DDICs, complete the following tasks:

Steps

1. Determine the status of DDIC LED.
   a. If the DDIC fault LED glows, it implies that the hard drive has failed.

      CAUTION: Confirmed that the particular hard drive contains no user data. The Fault LED alone is not an indication the hard drive can be safely removed.

   b. If the DDIC fault LED is not glowing, perform task 2 here.
2. Check the connectors and reseat the DDIC.

   CAUTION: This task should be only performed on unmanaged hard drives or after it is confirmed that the particular hard drive contains no user data. Mere glowing of Fault LED does not imply that the hard drive has failed (you can remove the hard drive even if the Fault LED is glowing).

   a. Remove the DDIC.
   b. Check the DDIC and the backplane to ensure that the connectors are not damaged.
   c. Reinstall the DDIC. Ensure the DDIC contacts the backplane.

Troubleshooting I/O EMMs

About this task

To troubleshoot I/O EMMs, complete the following tasks:

Steps

1. Check the pins and reseat the EMM.
   a. Remove the EMM.
   b. Verify that the pins on the backplane and the EMM are not bent. If any pins are bent, do not attempt to correct them; instead, contact Dell technical support services for further instructions.
   c. Reinstall the EMM.
2. Determine the status of the EMM power and Fault LEDs. If the Fault LED glows, it implies that the EMM has failed.
3. Verify link status. If the link status LEDs are not glowing green, check the cables.
   a. Reseat the cables on the enclosure and the controller.
   b. Recheck the link status LEDs. If the link status LEDs are not glowing green, replace the cables.
4. Reseat the EMM by removing and reinstalling it.

   NOTE: Allow the enclosure to identify the EMM and determine its status.

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Technical specifications

The technical specifications of the MD1280 are displayed in the following tables.

Drives	
SAS hard drives	Up to 84 SAS hot-swappable hard drives (6.0 Gbps or 12.0 Gbps) and SSDs

Enclosure Management Modules (EMM)	
EMMs	Two hot-swappable I/O EMM modules

Connectivity	
Configurations	Various server-attached configurations as specified by your solution provider.

Backpanel Connectors	
SAS connectors	• Asymmetric SAS Cabling for connection to the host and for expansion to an additional enclosure • Support Mini-SAS to Mini-SAS cable universally keyed for the following lengths that are currently supported: 0.5m–6m **NOTE:** SAS connectors are SFF-8086/ SFF-8088-compliant.

LED Indicators	
Front panel	• One two-digit LCD indicator for Unit ID, error code, and unit location identifier • One two-color LED indicator for power status • One single-color LED indicator for module fault status (enclosure as a whole) • One single-color LED indicator for logical fault status (hard drive, HBA, RAID controller) • One single-color LED indicator for drive drawer 1 fault status • One single-color LED indicator for drive drawer 2 fault status
Disk Drive In Carrier (DDIC)	One single-color LED for hard drive fault status

LED Indicators	
6 Gbps SAS I/O module	14 one-color LED status indicators, four each for the three SAS ports, and two for the module status
Fan module	• One single-color LED indicator for module status • One single-color LED indicator for battery fault status (not currently used) • One single-color LED indicator for fan fault status • One single-color LED indicator for power status
PSU	• One single-color LED indicator for PSU fault status • One single-color LED indicator for AC fault status • One single-color LED indicator for power status

Power Supply Units (per PSU)	
Watt	2.8 kW
Voltage	200–240 VAC (8.6 A–4.3 A)
Heat dissipation	191–147 W
Maximum inrush current	Under typical line conditions and over the entire system ambient operating range, the inrush current may reach 55 A for each PSU for 10 ms or less.

Available Hard Drive Power (Per Slot)	
Supported hard drive power consumption (continuous)	Up to 1.16 A at +5 V, Up to 1.6 A at +12 V

I/O Card Power (Per Slot)	
Maximum power consumed by I/O Card	11 W at +12 V
Maximum available power	100 W at +12 V
Maximum available power	1 W at +5 V (standby)

Physical	
Height	22.23 cm (8.75 inches)
Width	48.26 cm (19 inches)

Physical	
Depth (front mounting bracket to rear surface)	91.5 cm (36 inches)
Depth (front surface to rear surface)	96 cm (38 inches)
Full Weight (maximum configuration)	130.7 kg (287.5 lb)
Shipping Weight (without hard drives)	62 kg (137 lb)

Environmental	

NOTE: For more information about environmental measurements for specific system configurations, see **dell.com/environmental_datasheets**.

Temperature

Operating	5° to 35°C (41° to 95°F) with a maximum temperature gradation of 10°C per hour NOTE: Maximum 35°C up to 2134 m (7000 ft), derate to 30°C for 2134 m to 3000 m (7000 ft to 10,000 ft).
Storage	–40° to 70°C (–40° to 158°F) with a maximum temperature gradation of 20°C an hour

Relative humidity

Operating	20 percent to 80 percent (noncondensing) with a maximum humidity gradation of 10 percent an hour
Storage	5 percent to 100 percent (noncondensing)

Maximum vibration

Operating	0.21 g at 5–500 Hz for 15 min
Storage	1.04 g at 2–200 Hz for 15 min

Maximum shock

Operating	Half-sine shock 5 g +/- 5 percent with a pulse duration of 10 ms +/- 10 percent in operational orientations only
Storage	• z-axis: 30 g 10 ms half-sine • x-axis and y-axis: 20 g 10 ms half-sine

Altitude

Operating	–30.5 to 3000 m (–100 to 10,000 ft) NOTE: Maximum 35°C up to 2134 m (7000 ft), derate to 30°C for 2134 m to 3000 m (7000 ft to 10,000 ft).
Storage	–300 m to 12,192 m (–1000 ft to 40,000 ft)

Airborne Contaminant Level

Class	G2 or lower as defined by ISA-S71.04-1985

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Contacting Dell

Dell provides several online and telephone-based support and service options. If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer-service issues:

1. Go to **dell.com/support**.
2. Select your country from the drop-down menu on the bottom right corner of the page.
3. For customized support:
   a. Enter your system Service Tag in the **Enter your Service Tag** field.
   b. Click **Submit**.
      The support page that lists the various support categories is displayed.
4. For general support:
   a. Select your product category.
   b. Select your product segment.
   c. Select your product.
      The support page that lists the various support categories is displayed.